

## CLEANING DEVICE FOR A WATER CLOSET

## Description

The present invention refers to a cleaning device for WC toilets and the like, including a brush comprising a substantially cylindrical brush head connected to a shaft or handle, the brush head being provided, in a manner known per se, with radially extending bristles.

Cleaning devices of this kind are known by e.g. the patent publications US 5,640,722 and SE 521 545. The brush of said devices is either suspended by a template or fixed into a conically formed wire structure when stored.

A disadvantage of cleaning devices thus already known is that the brush may be unsatisfactorily cleaned, is stored openly in the air on e.g. the floor of a toilet room, often in an open vessel. All this means a considerable risk of infection.

The object of the present invention is to avoid and eliminate said disadvantages in a cleaning device according to the preamble of claim 1. This object is achieved by the measures of the characterizing part of said claim. Further developments are disclosed in the dependant claims.

The gist of the invention is that the brush, when not in use, is stored surrounded by the flushing water in the cistern of the WC toilet, either in the cistern itself or in a separate device outside the cistern but connected to the same. At storage the brush is isolated from the surrounding air, being surrounded by a water volume, a water zone, making part of the flushing water. The brush is also cleaned by the device.

The object of the invention is achieved by a combined storage and cleaning assembly comprising a substantially cylindrical structure encompassing the brush and allowing the brush to move axially within the structure, which in the storage position of the brush accommodates the head of the brush resting at the lower portion of the structure, said cylindrical structure preferably being a circular cylindric wall structure

comprising openings leaving intermediate wall portions of which at least one axially extending area has an inner diameter smaller than the outer diameter of the brush head so as to cause the bristles of said head to be momentarily bent by said at least one portion, when the brush is moved in the structure, to then flip back when the brush reaches an opening, the brush bristles thus being subjected to a cleaning action, the structure in the brush storing position being submersed in water encompassing the aggregate to such level that at least the head of the brush be covered.

A further advantage of the invention is that the brush is exposed to an extra cleaning operation each time the toilet is flushed.

The invention will now be explained with reference to the attached drawings, illustrating:

- Fig. 1 a preferred embodiment of the invention and an enlarged part thereof,
- Fig. 2 a preferred embodiment of a wall structure shaped as helical spring wire,
- Fig. 3, 4 a second embodiment of a structure in two alternative variants,
- Fig. 5, 6 end views of the two variants of the second embodiment of wall structures of figs. 3 and 4, respectively,
- Fig. 7 a third embodiment of a wall structure,
- Fig. 8 a fourth embodiment of a wall structure,
- Fig. 9 an end view of the structure of fig. 7,
- Fig. 10 an end view of the structure of fig. 8,
- Fig. 11 a brush with handle, template, shaft and brush head,
- Fig. 12 a brush with detachable brush head,
- Fig. 13 a section V-V of the brush head of fig. 14,
- Fig. 14 a top view U-U of the brush head of fig. 13,
- Fig. 15 the shaft of the brush of fig. 12,
- Fig. 16 a view Y-Y of the lower part of the brush shaft of fig. 15,
- Fig. 17 a section of the position in which the brush head can be detached from the shaft,

Fig. 18 a device according to the invention attached to the outer side of a water flushing cistern,  
Fig. 19 the device of fig. 18 in a greater scale, partially in section,  
Fig. 20 a side view of the water flushing cistern of fig. 1,  
Fig. 21 a top view A-A of the water flushing cistern of fig. 20,  
Fig. 22 a section B-B of the water flushing cistern of fig. 20,  
Fig. 23 a top view of a support ring for the spring of fig. 2,  
Fig. 24 a section C-C of the support ring of fig. 23.

In fig. 1, the left portion A of the figure illustrates a WC toilet 1 partly in section, with a flushing water cistern 2. A cistern lid is indicated by 9 and 3 is a wall structure in the form of a helical spring. The ends of the spring are denoted by 3'. An intermediate axial area 3" of the spring 3 has a diameter that is smaller than the diameter of the ends 3'. The inner diameter of the axial area 3" also is smaller than the outer diameter of the brush head 11' and the bristles 6. The free space in between the turns of the wire of the spring forms openings 4 in the wall structure. In between the openings 4 there are left wall portions 5. In this embodiment the spring wire turns constitute the wall portions.

The number 7 indicates the shaft of the brush and 7' is the handle of the brush, 8 denotes a template for supporting the brush on a support ring 24 when stored. 11' denotes the brush head, comprising a plurality of bristles 6 which will be described in more detail later on. From figure A it is apparent that the brush head 11' in storage position is submersed in a volume of water, a water zone, in the cistern as the normal level 10 of the water is above the brush head 11'.

The upper spring end 3' is supported transversely and axially by a collar 18 of the support ring 24 and the lower spring end 3' is supported in a similar way by extensions 17 forming a part of the bottom of the cistern 9. When mounted the spring 3 is prestressed such that it is pressed between the support ring 24 and the bottom extensions 17. The reason for this will be explained later.

The section B to the right in fig. 1 is an enlarged portion of the device i fig A indicated by a circle. The section B is located at the middle, restricted axial wall area 3" of the spring 3 in a situation when the brush head 11' is moved upwards (arrow 15) through the spring/wall structure for cleaning of the brush head, which is also visible in fig. B. As the inner diameter of the axial wall structure area 3" is smaller than the outer diameter of the brush head 11' the bristles 6' are bent downwards by the wall portions 5. The bristles will then slide along the wall portions 5 until they reach an opening 4. They will then be freed from the wall portions 5 and flip out into the openings 4, the bristles returning to their straight position 6 at the same time as possible dirt particles are thrown off from the bristles. Such particles are absorbed by and isolated in the water and will later on be flushed out of the cistern. When the brush is moved in the opposite direction to the arrow 15 there is also achieved a cleaning effect, however, the bristles 6 then bending in the opposite direction to the one 6' illustrated in fig. B.

From fig. 1 B it is obvious that the bristles 6' exert a pressure upwards on the wall structure portions 5 when they are bent. This means that the spring will be compressed in the direction of movement above the brush head 11' and will be lifted upwards below the brush head 11'. If improperly designed the spring 3 will then be lifted off the lower support 17 at the bottom of the cistern 2.

Vice versa, when the brush is moved in the opposite direction to the arrow 15 (downwards) the same goes for the collar 18 of the upper support 24. The collar 18 has to have an axial extension such that the spring end 3' can not get off the support collar 18. To avoid said situations the spring is prestressed to such extent that it will not leave its axial support surfaces under said pressure from the cleaning action of the brush.

Fig. 2 illustrates the spring 3 with denotations already explained. The spring wire turns and the distances therebetween

constitute the structure wall 3. The diameter of the lower end 3' of the spring may be chosen such that the brush head 11' is stored freely therein.

Figures 3 and 4 illustrate wall structures, preferably injection moulded of plastic material, the structures being two variants of the same basic concept. In the figures elements having the same function as the ones in figure 1, have the same main denominations, however, with the additions .1 and .2. The wall structures thus has a plurality of rings 5.1, 5.2, arranged transversely to the axis of the wall structures 3.1, 3.2. The rings 5.1, 5.2 are connected by axially extending ribs 12 and 13 respectively, attached to the outer and inner sides respectively, of the rings 5.1, 5.2. In between the rings 5.1, 5.2 there are formed openings 4.1, 4.2.

Figures 5 and 6 are end views A-A and B-B of the structures 3.1, 3.2 of figures 3 and 4 respectively. The diameters of the wall structures 3 are smaller than the diameter of the brush head.

Fig. 7 presents a structure 3.3e of a sheet of metal or plastic material, which in planar form has been punched by a plurality of staggered holes 4.3 and then rolled and formed to a cylinder by connecting the ends of the sheet. The wall structure has openings 4.3 and intermediate wall portions 5.3. Figure 9 is an end view of the structure of fig. 7. The inner diameter of the wall portions 5.3 is smaller than the outer diameter of the brush head 11'.

Fig. 8 illustrates a further, fourth embodiment of a wall structure 3.4 having transversely cut holes 4.4 forming elongate openings 4.4 in the wall structure 3.4. Fig. 10 is an end view of the structure of fig. 8. The material of holes 4.4 have been pressed inwards to constitute wall portions 5.4 for cleaning of the brush. The free inner diameter between the tongues thus has to be smaller than the outer diameter of the brush head 11'.

Finally it might be noted that the wall structures illustrated in figures 3 - 10 all are rigid. This means that

the wall structures may be fixed and supported only at the top end of the structure and be given a length such that the brush head at its lower position might be mainly below the structure meaning that the bristles are not deformed in the storage position.

Fig. 11 illustrates a brush with denotations already explained. Further there are arranged cuts 60 at the edge of the template 8. By these cuts 60 water, possibly gathered on top of the template 8 or the WC lid 9, can flow off into the cistern 2.

Fig 12 illustrates a brush with detachable brush head 11". This embodiment represents a more hygienic device in making it possible to replace a dirty and worn brush by a fresh one. For this purpose the shaft 53 and the brush head 11" are shaped such that they may be separated by releasable interactive locking elements arranged on the shaft 53 and the brush head 11" respectively. Additional designations in figure 12 are: 58 handle of the brush, 56 arms on top of the brush head, 56' hooks at the ends of the arms, gripping behind surface 61' of a shaft body 61, 62 a conical portion of the shaft and 64 cams on the body 61. This will be discussed in more detail with reference to figures 13, 14, 15, 16 and 17.

In the figures 13 and 14 - a section V-V and a view U-U respectively - the brush head 11" comprises a center sleeve 57 for adopting an end 63 of the shaft 53 and carrying the bristles 6 of the brush head 11". At the top of the head 11" there are arranged four elastic and axially extending arms 56 having inwardly protruding hooks 56', thus locking the brush to the shaft.

Fig 15 illustrates the brush shaft with handle 58, template 59 with cuts 60, shaft 53, shaft end 63, lock portion 61, 61'. Said portion has a conical form between the shaft end 63 and a cylindrical portion 61, carrying release cams 64.

Fig. 16 is a view Y-Y of fig. 15 illustrating the body 61. release cams 64, arms 56 and hooks 56' in a position where the

brush head 11" is locked to the shaft body 61, the hooks 56' gripping over the circular end surface 61' of the body 61.

Fig. 17 illustrates the position of the various elements in which position the brush head 11" may be detached from the brush shaft portion 63. In this position the brush shaft 53 is rotated by 90° (clockwise in fig. 16), the cams 64 bringing the outer ends of the arms 56 to the tops of the cams 64, thereby bending the arms 56 outwards such that the hooks 56' are free from the cylinder body 61 and may slip down to rest on the cams 64 with the inward end tips of the hooks 56' pressed radially against the body 61. By a little further rotation the ends 56' of the hooks 56 will be released from the cams 64 and may slide further downwards on the body 61 such as to be separated from the shaft 63, thus detaching the brush head 11" from the shaft 63. A new brush head 11" can then be attached to the shaft end 63 by simply pressing the brush head sleeve 57 onto the shaft end 63 and, if necessary, rotating the head a small angle to make the hooks 56' pass between the cams 64 and interlock with surface 61' of the body 61.

Figures 18 and 19 illustrate a separate cleaning device according to the invention, the device being attached to the water flushing cistern 2' of a WC 1'. Previously described parts have unchanged denotations. Further 25 denotes a housing, 27 and 37 lower and upper end covers respectively. The device is attached to the cistern wall 23 by two screw attachments 49 using two holes 23' in the cistern wall 23. The device will be described in more detail with reference to fig. 19.

Fig. 19 is a partial section in a greater scale of the device of fig. 18. In excess of the denotations of figure 18 the upper ring element 37 has an opening 41 for the brush and a support 36 for the upper end 3' of the spring 3. Between the outer diameter of the housing 25 and the inner diameter of the ring 37 there is a play. For attachment of the ring 37 to the housing 25 the ring preferably has more than one pin 39, extending inwards from the inner surface of the ring 37. Said pins 39 are to be entered into a corresponding number of J-formed

slits 26 by first pressing the ring 37 downwards, the pins 39 entering the vertical portion of the slits, then rotating the ring a small angle so that the pins 39 pass the lower mainly horizontal portion 26' of the slits 26. Then the ring is released so that thereafter the pins 39, pressed upwards by the prestressed spring 3, will rest at the top ends 26" of the J-shaped slits 26.

Of the two attachments 49 of the device to the water cistern the lower one includes a hollow bolt 30 for passage of water into the device from the cistern 2' and vice versa such that the water level 10' of the device follows the water level 10 in the cistern 2. In this way the attached device will operate in the same way as the device of fig. 1.

Fig. 21 is a front view of the cistern 2. The extensions 17 at the bottom of the cistern 2 has such a height that the lower spring end 3' will not be lifted so far as to be lifted off from the extensions when the brush is moved upwards and the bristles 6 of the brush head 11', 11" exerts an upward pressure on the lower side of the spring wire turns. In the same way the support and guiding portion of the support ring 24 is designed such that the upper spring end 3' does not slip off and comes free when the brush head 11', 11" is moved downwards.

Fig. 22 is a view A-A of the cistern 2 of fig. 21 and figure 23 is a section B-B of fig. 21. Further to previous designations 14 and 14' denotes support and guiding slots for the spring support ring 24.

Fig. 24 is a view of said support ring 24 and fig 25 a section C-C of the ring of fig. 24. Further to previous denotations 22 refers to an opening in the cistern 2 for seating the support ring 24 and also allowing the brush head 11', to enter the device, 16 is a flange and 18 is a cylindrical extension arranged for supporting the upper spring end 3'. As to the dimensions of the ring 24, vide the previous paragraph. 19 is an abutment for support of the template 8 of the brush 11'.



21 indicates the walls of a water trough in the cistern lid 9 for collection of possible water spill from the brush.

The above description refers to various embodiments of the wall structure and of the brush and brush head. It is obvious that a man skilled in the art may develop further embodiments within the scope of the present invention as defined in the patent claims.